FINAL REPORT

GRANT #: N00014-94-1-1134

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INSTITUTION: Saint Francis College, Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA), Loretto, PA

GRANT TITLE;   Rural Health

AWARD PERIOD: 30 September 1994 to 30 August 1998

OBJECTIVE: Test and evaluate the most effective and efficient methods, procedures, and technologies that will improve access to education and healthcare services in remote, isolated, and medically under-served areas through the use of advanced off-the-shelf computing and tele-communications technologies.

APPROACH:

1. NEEDS ANALYSIS: Identify specific requirements concerning the delivery of healthcare and education in remote and medically under-served areas. The military and rural communities often face the same barriers to the effective delivery of low cost, high quality healthcare and education to individuals residing in rural areas and remote duty stations. Obstacles such as harsh weather conditions, long distances, treacherous geographical terrain, lack of good highways and roads, and the absence of effective communications systems in these areas all contribute to a reduced quality and quantity of continuing medical education and healthcare.

2. "BEST PRACTICES" DEVELOPMENTAL MODEL: The "best practices" approach is used to solve the unique problems of a particular user. This approach identifies the most effective processes, procedures, and technologies available to create a sustainable solution for each particular user's needs. Without regard to specific vendors or manufacturers, CERMUSA and the end user evaluate and rate different technologies to identify the most efficient and effective models available. Subsequently, research prototypes are developed that address the defined requirements using the selected technologies. The user is then trained on the operation and maintenance of the hardware, software, processes and procedures, the research is carried out, and the data are collected.

3. DATA ANALYSIS AND DISSEMINATION OF RESULTS: After the requisite number of data are collected, it is compiled, analyzed, and disseminated through refereed journals, technical reports, presentations, and demonstrations. Frequently, the results of these studies are combined with emerging technologies to address new requirements.

ACCOMPLISHMENTS:

1. US Navy Train-the-Trainer Course: Instructions to Navy personnel using state-of-the-art techniques, management approaches, and technology

to educate and train in the healthcare sciences using distance learning applications. Study title "Using the Electronic Classroom: A Hands-on Approach for Health Science Educators" was presented to the Navy and Physician Assistant Training Directors on the campus of Saint Francis College. This three-day seminar discussed a wide array of technologies available to educators today, which will expand the impact of education in the classroom.

2. Clinical Skills Refresher Course for Healthcare Providers (CME): The educational aspect of the course was to provide an overview of accepted medical principles and to build upon these concepts with information on the latest medical innovations. The course improves the knowledge and skill level of the United States Department of Justice, Federal Bureau of Prisons Physician Assistants and Nurse Practitioners using telemedicine technologies and distance learning applications.

3. US Navy Correspondence Courses On-line: CERMUSA is developing a distance learning research prototype that will assist the Navy in updating their on-line correspondence courses to fit the multimedia technologies of the Internet. By adding digital graphics, audio/video streaming, on-line testing and other interactive devices to these on-line courses, CERMUSA hopes to enhance the learning experience for Navy healthcare personnel.

4. Distance Learning Prototype Laboratory (DLPL) prototype: The laboratory offers an opportunity to research a "best practice" approach, demonstrating how high-end video production, computer graphics, and teleconferencing technologies can together improve distance learning and telemedicine education and training. The results of the study will be used to provide multimedia tools such as streaming video, media presentations, and animated graphics during future distance learning courses.

5. Master of Medical Science Distance Learning via Electronic Classroom: This research has enabled the delivery of a Master of Medical Science program to active duty military Physician Assistants stationed at locations throughout the United States and civilian PA students. All students are able to complete their MMS degree from their distant sites while being considered resident MMS students at their respective locations.

6. Graduate On-Line Courses: The Advanced Pharmacology Course and the Research Methodology Course study the educational, organizational, and technical criteria required for developing a successful advanced healthcare training course using both asynchronous and synchronous modes of teaching. This study tests the quality, effectiveness, and capabilities of a complete distance education course. Throughout the study, test results of the distance learning classes are compared to classes taught in a traditional classroom. The results of the study revealed that distance learning is an effective method of delivering education to remote students.

7. Telemedicine Operational Infrastructure Development: Using CERMUSA's community partnership network previously established, CERMUSA is gaining a reputation for being at the forefront of healthcare technology. The challenges of telemedicine implementation have seemed to outweigh the efforts put forth. Hospital merger, downsizing, budget cuts, and difficulties with Telecom providers have contributed to the challenges encountered; however, despite these complexities and challenges, CERMUSA has continued its efforts in telemedicine research and implementation with positive results.

8. Center for Assistive Technologies (CAT) at Hiram G. Andrews Center in Johnstown, PA and Center for Rehabilitative Technologies (CART) at the University of Pittsburgh School of Health and Rehabilitation Sciences has joined forces with CERMUSA to research the ability to develop a mid-level communications infrastructure to allow for remote consults of clients between the two centers.

9. Mobile Telerehabilitation Evaluation (MTE) with Hiram G. Andrews Center: CERMUSA is working on a Mobile Tele-Rehabilitation Evaluation (MTE) unit to provide rural, remote access using analog phone lines to connect isolated patients to rehabilitation specialist located in major metropolitan areas. These evaluations demonstrate the cost-effectiveness of performing Assistive Technology evaluations over analog phones lines using a video teleconferencing interface.

10. Conemaugh Health Systems Remote/Rural Consultations with Meyersdale Medical Center: CERMUSA has established a remote consultation research program between a major health facility and a remote, rural facility with limited coverage by physicians. This research tests the feasibility of remote evaluations of patients to determine transportation to the emergency room or if the patient is able to wait for the local physician to arrive. The lack of consultative capabilities has placed stress on physicians in remote areas and this research has increased satisfaction of rural physicians in their ability to provide quality care to patients, the feasibility of transmitting high quality echocardiograms, and other specialty consults to the larger healthcare facilities.

11. Conemaugh Health Systems Tele-proctoring Family Practice Residents at Ebandjieff Health Center: This prototype was designed to test the feasibility of providing and improving the quality of the residents' supervision by using video teleconferencing between the 3rd year resident located in a remote clinic and the instructor physicians located in the medical school facility. Telemedicine technology was implemented at each site and allowed the user to capture and send still images along with full VTC capabilities for private proctoring between the resident and the physician.

12. Altoona Hospital Medical Consultations to Miners Hospital and the Federal Correctional Institute, Loretto, PA (FCI, Loretto): CERMUSA installed telemedicine technology to provide medical specialty consultative services to these two remote medical facilities. CERMUSA is working with Miners Hospital and FCI Loretto to provide real-time VTC and telemedicine capabilities to access Altoona Hospital's specialist and resources to reduce provider patient isolation and increase access to quality healthcare services. CERMUSA designed, intergraded, installed and trained prison healthcare practitioners on the use of Telemedicine and VTC technologies to facilitate remote consults. FCI, Loretto was one of the first fully-integrated and secured telemedicine suites in the country providing immediate access to specialists located in Altoona Hospital and eliminating the need to transportation prisoners to hospitals for specialty consults. Miners Hospital's research design was to provide access to specialist from the Emergency Room and also provide remote practitioners with access to education and certification opportunities using the VTC capabilities.

13. John P. Murtha Electronic Classroom on the campus of Saint Francis College expands the capabilities of distance learning by developing and enhancing instruction by providing Internet access for the instructors and students. Interactive software was installed to enhance the instruction and "instructor focused" design of the technology and has made it easier to use for the non-technical. CERMUSA has applied "backward compatibility" allowing for the use of old media information to

merge to the newer technologies. CERMUSA has improved the VTC capabilities of the room and has installed a "Laptop Solution" which allows students access to computer technologies within the classroom.

SIGNIFICANCE: The results of this program will lead to the development of sustainable processes, procedures and integrated technologies that will provide increased access to quality education and healthcare to individuals in isolated and underserved areas. Through careful research and development, advanced technologies can be used to improve the delivery of healthcare and education in remote civilian and military populations.

WORK PLAN: Since its inception in 1994, CERMUSA has established ties with numerous community partners and continued to expand its staff and internal resources. During the next few years, CERMUSA plans to continue to emphasize its research into the new and emerging technologies in both Telemedicine and Distance Learning. CERMUSA, with their partner Hiram G. Andrews Center (HGA), will continued to provide rehabilitation services to individuals in remote areas through the application of advanced technologies and techniques.

PUBLICATIONS, ABSTRACTS, PRESENTATIONS, AND DEMONSTRATIONS:

PEER-REVIEWED JOURNAL PUBLICATIONS:
1. Bates, James, Ph.D.: "CERMUSA". For The Record, Vol. 10 No. 19, September 1998.
2. Lombardi, Beth Ann, and Bates, James F.: "Telemedicine". Vim & Vigor. Spring, 1998.

ABSTRACTS:
1. Mills, O. R., Tatarko, M., Bates, J. F., et al, "Telemedicine Precepting in a Family Practice Center." Family Medicine. Submitted for consideration.
2. Mills, O. F., Bates, J. F.: "Interactive Video Conference Education in a Family Practice   Center." Family Medicine. Submitted for consideration.

PRESENTATIONS:
1. Bates, James. F.: 2nd Annual Telehealth Workshop for the American Indian Information Network "Lessons to be Learned in Launching a Rural Telemedicine Program" July 28-30, 1998.
2. Mills, Orlando: "Telemedicine Precepting in the Family Practice Center". For the   Pennsylvania Academy of Family Practice Annual Meeting, April 2, 1998.
3. Bates, J. F., Duryea, W.: "Distance Education: Lessons Learned about Instruction and Construction". Council of Independent Colleges' 9th Annual Information Technologies Workshop, March 27, 1998.
4. Bates, James F., Ph.D.: "Lessons Learned in Launching a Telemedicine Program". Telemed III Conference, Anaheim, CA., November 6, 1997.

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14. ABSTRACT
The Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) at Saint Francis College, Loretto, PA was created in response to a need for a rigorous scientific approach to determine the most efffective and efficient means to improve access to quality education and healthcare in rural and isolated areas. CERMUSA is relevant to the military and the civilian sector because it stresses the provision of healthcare and education to individuals in remote and isolated areas by enhancing the ability of rural providers to gain access to quality medical consults and education. CERMUSA has developed an infrastructure of rural community education and healthcare providers who perform as an unbiased 'test-bed' for building relevant research prototypes. CERMUSA's first year developed a "Needs Assessment" and in the second year developed a "Best Practices" model. Now in the third year, CERMUSA has matured and grown the community infrastructure; identified additional distance learning and telemedicine research requirements; collected and analyzed the data; and published and presented the data to constituent groups.

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